GERMANY'S NEW POWER • PC WARS • JAPAN'S LATEST STRATEGY

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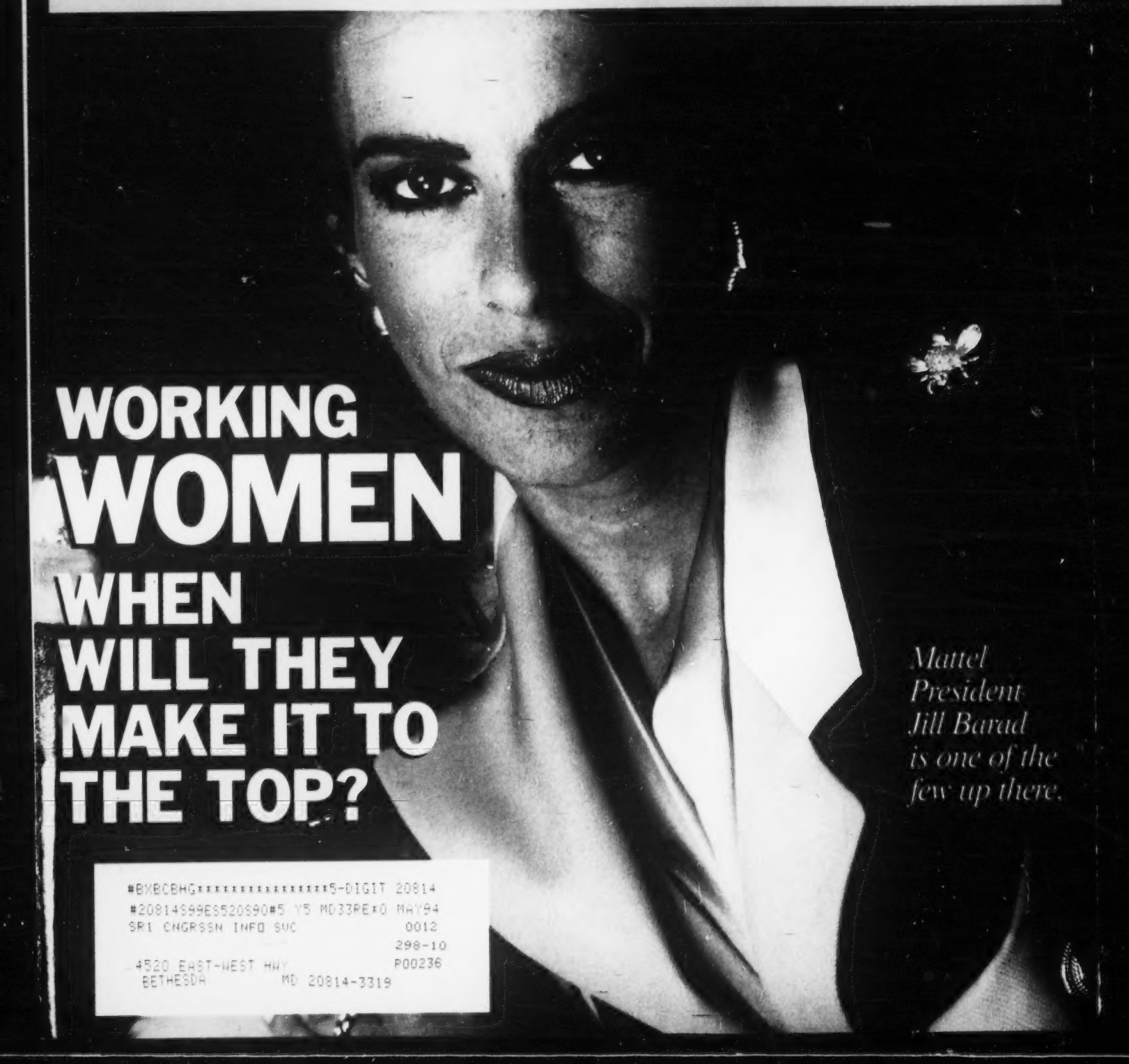
FORTUNE



WORKING WOMEN

WHEN WILL THEY MAKE IT TO THE TOP?

Mattel President Jill Barad is one of the few up there.

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"You have to be willing to step out of the pack and take risks, even be willing to jump completely out of your element, if that's what it takes." 44

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After a mighty effort, top U.S. companies are closing the quality gap. But their toughest rivals—guess who?—have moved on to *flexibility*. Its watchwords are change fast and respond quickly to customers. Manufacturers and service companies will have to play the game to prosper. It's catch-up time again. *by Thomas A. Stewart*

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ABOVE: Carol Bartz, newly named chairman and CEO of Sausalito-based software company Autodesk. Photo by Dana Fineman—Sygma.

COVER: Jill Barad, president of Mattel, also photographed by Dana Fineman of Sygma.

WHEN WILL WOMEN GET TO THE TOP? 44

Not for a long time yet, says a surprising FORTUNE CEO poll. Discrimination still abounds. But some pioneers are already there, and others are doing all the right stuff. And in a global economy, no company can afford to waste brainpower simply because it's wearing a skirt. *by Anne B. Fisher*

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Yes, women still face discrimination. But this woman writer argues that the way to overcome is to stop acting like victims and start outdoing men at their own game. *by Nancy J. Perry*

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EDITOR'S DESK

TRACKING WOMEN'S PROGRESS

Writer Anne B. Fisher handicaps the race to the top.

FROM CONSERVATIVE politicians to ardent feminists, everyone is raising questions about the role of working women. FORTUNE provides some answers. When will women rise to the top in corporate America? What is holding them back? How can they advance faster? We put those questions, and more, to 201 chief executives of major corporations. Their responses will arouse some people, infuriate others, inspire still others—and, we hope, illuminate all.

In addition to analyzing the poll results, associate editor Anne Fisher reports on what companies are doing to remove obstacles that have hampered women. In an accompanying essay, Los Angeles bureau chief Nancy Perry declares that too many women hurt themselves by being more concerned with discrimination than performance. In her interviews with top women executives, a consensus emerged: Talent and assertiveness mean much more than gender.

"What's striking about both stories," says senior editor Richard Kirkland, "is the amount of agreement between male CEOs and female managers: The glass ceiling is real, they say, but the cracks in it are growing and should widen dramatically as new leaders take charge."

●

I'm sorry you didn't know Dick Armstrong. He was one of those rare people who always got you to think—and just as easily to laugh. We at FORTUNE were lucky to have this witty, warm, superintelligent Mississippian as our colleague since 1969. He was a primary force in the direction of our magazine, first as assistant managing editor from 1974 to 1977, then as executive editor until he retired in 1989. He was a model for a whole generation of our writers, reporters, and editors. He was also a brilliant wordsmith; had he edited these remarks, he would surely have improved them.

Dick died in August after a brave struggle with cancer. He was 62. We miss him very much. His influence will be felt for many years to come.

Executive editor Richard Armstrong (1989)

Marshall Loeb

MANAGING EDITOR

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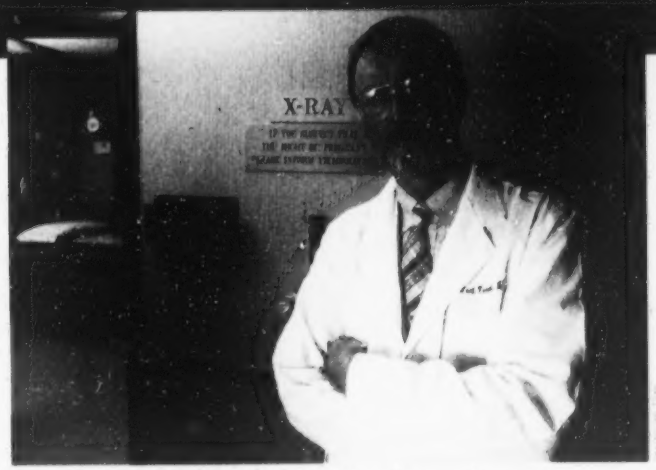
fancy fish can be explained. In September of 1991, 550 members of five unions, including the Hotel Employees and Restaurant Employees International and the Teamsters, struck the Frontier Hotel & Gambling Hall on the Strip. Labor claims the Elardi family, which owns the Frontier, is union-busting by eliminating its pension plan and cutting wages.

Executives of the bigger casinos are backing the unions. They see the Frontier's belligerence as a threat to the town's hoped-for image as a family resort destination. Says William Bennett, CEO of **Circus Circus Enterprises**, a gaming company with over $800 million in sales last year: "Las Vegas has enough of an image problem without the Frontier making it worse. We just had a record quarter, and we're unionized." So are about 80% of the hotels and casinos in Las Vegas.

A true Las Vegan, Bennett put some cash behind his opinion. And that's where the salmon swims in. In mid-August a food truck from Circus Circus began delivering three meals a day to several hundred picketing Frontier workers. A recent breakfast menu included eggs, bacon, hash browns, biscuits, pancakes, and melon. At least once, poached salmon was served for dinner. Bennett says the feedings, which cost $600 per day, are paid for partly by Circus Circus and partly out of his own pocket. Bennett hopes his efforts will pressure the Frontier to return labor peace to the Strip.

– **Andrew E. Serwer**



Kurad is trading in his M.D. for an MBA and a consulting practice.

BIRTHRATES *IN EXTREMIS*

■ The mix of citizens in developed countries is tilting toward the old. For youth, look to the Third World, particularly sub-Saharan Africa, where families average six-plus children each (see chart). About two of ten children in the region die before reaching age 5.

It's the old story: As nations industrialize and become more prosperous, their birthrate falls. Populations in many developed countries are not even reproducing themselves. The private Population Reference Bureau in Washington, D.C., says that Western Europe and Japan check in at or below replacement level—two babies per mother. The U.S. is holding its own, due to a slightly higher birthrate, immigration, and the boomers' baby boomlet—that is, more couples having babies.

Neither birthrate extreme is good. Less developed countries must expand their infrastructures to support growing populations but don't have the economic growth to pay for it. Industrialized countries face a deficit of the workers they will need to support older generations. Despite their opposition to immigration now, Japan and Europe ultimately may have to import more workers to make up the shortage. – **Karen Nickel**

WHOSE POPULATION IS AGING FASTEST

COUNTRY	MEDIAN AGES PAST & PROJECTED 1990	2010
Italy	36.2	42.4
Japan	37.2	42.2
Britain	35.7	40.0
U.S.	32.9	37.4
Korea (North & South)	25.7	34.4
China	25.4	33.9
Brazil	22.9	29.2
Mexico	20.0	26.5
Nigeria	16.3	18.1

PHYSICIAN, DEAL THYSELF?

■ Doctors are heading to business schools to discover a cure for tighter government regulations, onerous insurance requirements, and increasing scrutiny of their fees—or else to find a new career. Health care professionals account for 12% of the class in Wake Forest University's Babcock executive MBA program, up from 6% three years ago. Other B-schools with executive MBAs—including Minnesota's Carlson and Southern Methodist's Cox—are seeing like gains. Wake Forest is also one of six universities that offer a combined M.D. MBA program.

Ward Kurad, 58, a urologist in Hickory, North Carolina, is a 1991 Babcock grad. He's giving up his practice of 27 years to become a consultant to businesses and hospitals. Says he: "The medical profession has had a blank check for 25 years. Now we have to start using the tools—quality and cost control, outcomes management—that business has been developing over that time."

Doctors who manage their own medical groups are coagulating at organizations such as the American College of Physician Executives, which leads management seminars.

Kurad estimates that as a consultant he'll earn $100,000, half what he made as a physician. Says the good doctor: "I still love the medical aspects of practicing, but I've burned out on the paperwork mill and the hassles with insurance and Medicare."

– **Rick Tetzeli**

NOW HEAR THIS

■ **WALTER SCHUETZE,** 60, chief accountant of the SEC, on why banks should mark their loans to current value rather than to historical cost:

"Take a wristwatch, and go down to a pawnbroker and try to get a loan on it based on your cost. You'll find out how useful cost is."

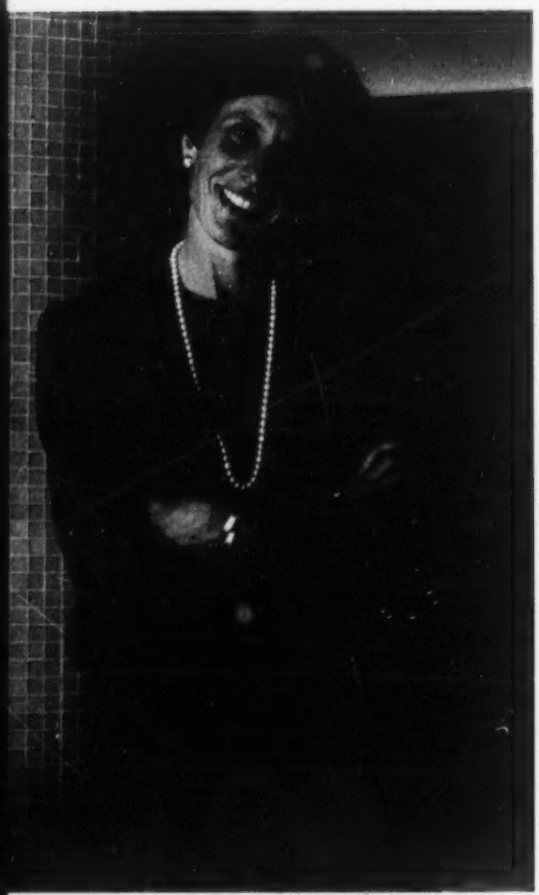
■ **ALLAN GILMOUR,** 58, executive vice president of Ford Motor, explaining why the Ford Explorer is the best-selling consumer product in the country costing more than $20,000:

"In difficult economic times, this is a classless product. If you used to have a Mercedes and can't afford it anymore, you can have an Explorer and people won't think you've run out of money."

WHEN WILL WOMEN GET TO THE TOP?

Not for a long time yet, according to a new FORTUNE CEO poll. But a few pioneers are already there, and a growing crowd of others are doing all the right stuff. ■ *by Anne B. Fisher*

TALK FOR A WHILE with any woman who has worked her way to the top of a sizable U.S. corporation. You'll get a strong sense that she feels a bit like *Apollo 14* astronaut Alan Shepard when he improvised a six iron out of a piece of lunar equipment and, one-handed in his cumbersome space suit, whacked a golf ball that flickered eerily across the airless surface of the moon. Exhilarated, isolated, keenly aware of the world's attention (*"Houston, can you see me now?"*), female high executives are eager to colonize this unaccustomed terrain with more of their own. But like astronauts, they know too much about the rigors of the journey to believe that it can happen by next Wednesday, or even by next year. Says Carol Bartz, 44, recently named chairman and CEO of Autodesk, a leading maker of software for engineers and architects in Sausalito, California: "I think that women in corporate America are still a generation away from real success."



IRENE ROSENFELD, 39, executive vice president, Kraft-General Foods: "Do your job brilliantly, and the cream will rise to the top."

Q **How likely is it that your company will have a female CEO ...**

A

	In next 10 years?	In next 20 years?
Very likely	2%	18%
Somewhat likely	14%	63%
Not very likely	42%	15%
Not likely at all	40%	2%
Not sure/ no answer	2%	2%

Alas, the top men in corporate America appear to agree. A poll of 201 chief executives of the nation's largest companies, conducted exclusively for FORTUNE by the opinion research firm Clark Martire & Bartolomeo, reveals that only 16% believe it is "very likely" or "somewhat likely" that they could be succeeded by a female CEO within the next decade. And only 18% think it's "very likely" that even after 20 years a woman would be picked to run their companies.

Why? The CEOs in our survey cite a host of reasons, but the biggest barrier, as a few of them admit, is an irrational one—plain and simple discrimination. Notes John H. Bryan, 56, CEO of Sara Lee: "I'm not sure there's a lot that women can do about it. They're already working hard and are very qualified. It shouldn't be this way, but too many senior managers, and particularly CEOs, tend to want to pass their jobs along to someone who's the image and likeness of themselves." John Nelson, 48, who heads Norwest Colorado, a bank holding company, agrees: "The problem with women advancing has more to do with men than with women. Men have dragged their feet."

Thanks for the honesty, guys, but that's pretty discouraging news. And coming during an election year in which, incredibly, some conservative politicians and leaders of the religious right are openly or implicitly condemning the very notion that women *should* work outside the home, it's enough to make even the most optimistic female executive despair. That would be wrong, however, because better days *are* coming.

True, progress has been painfully slow, and there has even been some backsliding. Susan Lowance, director of senior executive programs at MIT's Sloan School of Management, points out that the executive-training seminars run by U.S. business schools—an indispensable credential for future CEOs in many companies—are almost as exclusively a male preserve as Bohemian Grove. Enrollment in these

REPORTER ASSOCIATE *Therese Eiben*

PHOTOGRAPHS BY DANA FINEMAN—SYGMA

CAROL BARTZ, 44, chairman and CEO of California software maker Autodesk: "You have to be willing to step out of the pack and take risks, even jump completely out of your element if that's what it takes."

programs nationwide is just 5% female, after peaking at 8% in the late 1980s. "Companies were trying a little harder, for a while, to develop senior women managers," Lowance explains. "But the recession scotched that. In tough times, top management prefers to entrust the risks that accompany decision-making at the highest levels to a known quantity—meaning someone like themselves. A man."

Here's more bad news: The Department of Labor's latest report on the limits to promotion of women at 94 major government contractors finds that few are being groomed for senior-level jobs. "The glass ceiling in most companies is a lot lower than we thought it was," says Labor Secretary Lynn Martin. "And too few women are getting the training they need to move up."

Nor have women managers achieved paycheck parity with men. Among all females with full-time jobs, the much publicized wage gap between the sexes keeps shrinking. On average, a woman now earns about 74 cents for every dollar a man brings home, up from 65 cents a decade ago. Those relative gains reflect the fact that women are better educated and hold more highly skilled positions than ever before.

What's frustrating is that at the same level of management, the typical woman's pay is lower than her male colleague's—even when she has the exact same qualifications, works just as many years, relocates just as often, provides the main financial support for her family, takes no time off for personal reasons, and wins the same number of promotions to comparable jobs. That discouraging conclusion comes from a new study of 1,029 managers at 20 FORTUNE 500 companies across eight industries. Over five years ending in 1989, women managers' pay increased 54%, their male counterparts' 65%.

Says Linda Stroh, 44, one of the study's co-authors, who teaches in the Institute of Industrial Relations at Loyola University in Chicago: "The disparity probably comes partly from the lingering and often unconscious perception that women are going to leave to have babies. But the women managers we studied were in the work force to stay and had done all the right stuff. It still wasn't enough."

Even so, most of the available data support the notion that, on balance, women in the workplace undeniably are advancing. To a man—and that's what they all are—the CEOs polled by FORTUNE say over the past five years the number of female middle managers at their companies has either increased (92%) or stayed about the same (8%). As for female officers, 62% of chief executives say their number rose as well. Insists Richard Deihl, 64, chairman of H.F. Ahmanson & Co., a big California mortgage lender: "Women are already moving up into higher and higher positions. We should at least see a woman chief operating officer here well before 20 years from now."

Labor Department statistics support this upbeat forecast. Using a broad-gauge definition of "manager" that includes everybody from the head of a fast food restaurant to a CEO, Labor reports that about 41% of U.S. managers were female as of mid-1991, up from 32% in 1983.

FORTUNE's own research suggests that a similar though smaller increase occurred in the number of top female managers. To see if America's business leaders were really walking their talk on this subject, we commissioned Directorship, a research and consulting firm in Westport, Connecticut, to comb the 1986 and 1991 annual reports of the companies whose

Q How has the number of female executives in your company changed over the past five years?

A

	Middle managers	Officers
Increased	92%	62%
Decreased	0	1%
About the same	8%	36%

bosses had answered our CEO poll. Its task: to tally the number of women who held senior positions in those two base years. We defined "senior" as a job within three levels of management of the chief executive's office. In the case of staff, that would encompass a chief financial officer or his equal, a company comptroller and his counterparts, and finally, say, someone like the head of the accounting staff. Among line officers, the three tiers might stretch from president to a division head.

Of this select group, 4.8% in 1991 turned out to be women. Think that's small? Go back five years, to 1986: Only 2.9% of senior managers were then female. Gazers at the half-empty part of glasses will quickly complain that roughly 5% is still a scant one-tenth the number of female managers we would have if women's presence in the executive suite matched their representation in the rest of the workplace. (Women now account for nearly half all full-time U.S. workers.) An optimist, of course, would applaud a rise of nearly 60% in just five years.

MOST IMPORTANT, evidence abounds that women's second-class citizenship in corporate America is finally about to be upgraded. Sex discrimination is already less of an obstacle in some industries than in others. High-tech and service companies, for example, are generally more inclined to promote women than old-line manufacturers in businesses like steel and autos.

One important agent of change will be demographics. Restructurings and layoffs have produced a surplus of skilled, experienced managers of both sexes. But rock-bottom birth rates in the early and midddle 1970s guarantee that later in this decade and well into the next one, not enough boy baby-busters will be there to fill the new managerial jobs that the economy will generate. Any business that wants to stay competitive will have to hire, train, and reward women.

Another demographic factor is the increasing prevalence of two-career marriages. Ellen Galinsky, co-president of a nonprofit New York City research and consulting group, the Families and Work Institute, often conducts focus groups with men in their 20s and 30s. "These men are almost all in dual-career households, and they have a totally different perspective from their fathers' generation," she notes. "They empathize far more with conflicts between family and work responsibilities, since they know firsthand what it's like to have no full-time help tending the home fires. They quite often say to me, 'These guys upstairs who are running things just don't *understand*.' "

Q How widespread a problem is discrimination against women?

A

	Middle management	Top executives/ officer level
Very widespread	6%	20%
Somewhat widespread	52%	44%
Not really a problem anymore	38%	31%

Galinsky believes that as the current crop of thirtysomethings ascend to positions of power, companies' cultures are bound to become more flexible—and less insistent that a valued manager choose, in effect, between a child and a promotion. Jill Elikann Barad, 41, who in July was named president and chief operating officer of Mattel, the $1.6-billion-a-year toymaker, shares that faith in generational change. When told the results of FORTUNE's CEO poll, she dismissed as "ridiculous" the notion that women must expect to wait 20 more years to become chief executives. She says: "I don't know how these guys can say that. Maybe they won't be the ones making the decision."

Finally, there's the "pipeline" argument. For at least ten years we've all been hearing that while there aren't yet enough qualified women, as their number and experience increase, more will reach the top. Fully 64% of CEOs in FORTUNE's poll attribute women's absence from the executive suites in large part to lack of experience. "We've always joked that it takes 30 years to be al-

D. J. HULET, 36, regional marketing manager, Pacific Bell: "I'm very candid and speak my mind. Other managers have told me, 'If you did the same things you're doing and you were a guy, you'd be OK.' "

owed to empty the wastebaskets around ere," says Charles A. Corry, 60, chairman f USX Corp. "It took me 21 years and 12 ob changes to become a vice president. It's he same for women. It takes time." Robert . Winters, 60, CEO of Prudential, agrees: Women should persist, endure, hang in. The wave is really crest high now. Women re making a mark, but they have to keep p the good work."

It's been a wearisome slog, but a light is ow glimmering at the end of the pipeline. The Bureau of Labor Statistics reports that here are 6.1 million female managers in he U.S., up from about 3.5 million in 1983. These women, many of whom are in their arly 30s to mid-40s, are the first genera- ion to accumulate the same education, ex- erience, and expectations as their male ounterparts, and to find strength in their onsiderable numbers. Says MIT's Susan owance: "If many women are ever to each the top of corporations, it's the ones n that big middle-management group who re going to do it." Labor Secretary Martin xpects those middle managers to push ard for recognition. "A lot of us thought ur pioneering days were over," she says, but they aren't."

That's why the smartest companies are levoting ever more time and resources to roadening and developing the talented fe- nale middle managers they have already ired. Hardly any of the CEOs polled by FORTUNE—only 8%—think women lack he aggressiveness or determination to cale the corporate heights. And just 5% aid that women should be more willing han they are to relocate for a promotion, n issue that some studies have suggested is eeping good female managers down. But nearly half insisted that the reason it will ake two decades for a female to rise to the op of their companies is that women man- agers are still too concentrated in fields such as communications and human re- sources, which rarely if ever lead upward.

"It really isn't a question of what else women should be doing. It's a question of what *companies* should be doing to ensure that women are getting the opportunities men get," says William Ruckelshaus, 60, chairman of Browning-Ferris Industries. Even in relatively nonsexist industries like retailing, some CEOs think there's much to be done. "We have to step up our commit- ment to exposing women to different di- mensions of the business," says Allen Questrom, 51, chairman of Federated De- partment Stores. "Management has a clear

KERI BAUCH-SPARKS, 37, information systems manager at a Monsanto plant in Illinois: "Some men's initial reaction to diversity training is defensive. They think it's going to be a lot of finger pointing."

responsibility to prepare women for broad- based roles."

Toward that end, dozens of corporate colossi, from AT&T to Johnson & Johnson to Xerox, have hired full-time "diversity man- agers," charged by top management to make the workplace more hospitable to tal- ent of either sex and all colors. In some cases this is pure tinsel and tokenism, but for many companies it's a hard-nosed business strategy. Says Aetna Life & Casualty CEO Ronald Compton, 59, who is largely respon- sible for the fact that roughly half his com- pany's managers are now women: "I'm not doing this out of the goodness of my heart. I'm selfish. I want the very best people I can get. A lot of them happen to be women." No diversity campaign will succeed without that kind of blessing from the top.

Alarmed that turnover among female en- gineers and salespeople was twice as high as among men, chemical giant Monsanto hired a consultant to do exit interviews with departing women. Most said they'd had better offers from competitors or planned to start their own firms. "There is a glass ceiling at Monsanto," admits vice president of administration Michael Miller. "We're trying to break it." How? Like many anoth- er company with a formal diversity pro- gram, Monsanto now evaluates—and pays—its managers partly on the basis of how carefully they identify, train, and pro- mote women.

Accounting behemoth Arthur Andersen recruited Joseph Stokes, a psychology pro- fessor at the University of Illinois at Chica- go, to help it work out a diversity program. Stokes says that to ensure that women get more of the broad experience required to rise to officer status, companies must stop assuming that men are automatically more willing than women to leap across division- al boundaries for new assignments. "More companies need to ask both women and men what their long-term career goals are, what kinds of jobs would interest them most, whether they'd consider an overseas transfer, and so on," says he. "And then use that laundry list—which is a kind of blue- print of a person's ambitions—and develop everyone accordingly."

BEYOND ALLOWING qualified women an equal chance at the same jobs men get, diversity-minded companies are trying to recast their cultures so that old attitudinal hurdles don't trip up women who might otherwise be gold medalists. Nancy Ham- lin, president of consulting firm Hamlin Fox in Marblehead, Massachusetts, has

HAZEL O'LEARY, 55, executive vice president, Northern States Power in Minneapolis, is learning how to play golf: "Without losing your personality, it's important to be part of the prevailing corporate culture."

spent 25 years as an adviser on gender issues to General Electric, Hewlett-Packard, Digital Equipment Corp., Fleet Bank, and the U.S. Coast Guard. She says that even in the best-intentioned and most progressive companies, women are usually kept out of the informal channels of information, where important decisions sometimes crystallize. Female managers, for example, are left behind when their male peers go out to lunch, or to a sporting event, or on a good old-fashioned pub crawl. "Men don't do this on purpose," Hamlin says. "They just don't *think* about it."

She and other diversity experts add that, since the Anita Hill–Clarence Thomas debacle, fear and confusion have multiplied. As she says, "Male executives will think, 'Hmmm, wouldn't it be easier, and safer, to take this business trip, or go to that client dinner, with another guy?' " But the most pervasive problem, and perhaps the most intractable one, is that a lifetime of social conditioning has trained many men to think of women as sweethearts, wives, daughters, secretaries—not as equal colleagues. Muses Hamlin: "It's hard to completely re-socialize people."

Hard, but not impossible. Short of waiting for the diehard chauvinists to retire or threatening to fire them if they can't get with the program, what can top management do? Monsanto's diversity effort is typical. The company holds workshops, run by consultants Pope & Associates, designed to expose and dismantle workers' prejudices. About 5,000 Monsanto employees have attended the six-day sessions, and more are signed up to do so.

Keri Bauch-Sparks, 37, an information systems manager at a Monsanto chemical plant in Sauget, Illinois, has been through this drill twice in the past four years. "Some men's initial reaction to it is defensive. They think it's going to be a lot of finger pointing," she says. "But the idea is to improve communications for everybody. Once people see that, they're generally enthusiastic."

In one exercise, the moderator asks group members to write down every stereotypical notion about women they can think of, and the answers are posted on the walls for discussion. One widespread perception among men, which comes up repeatedly, is that women make lousy candidates for promotion because they always put their personal lives, particularly their children, ahead of work. "When you see this stuff up on flip charts around the room, it gets people thinking," says Bauch-Sparks. "Society has been telling us these things for years, but do we necessarily believe they're true?" Slowly but certainly, perceptions at Monsanto are changing, and that seems to be encouraging ambitious women to stick around. Turnover is down, and a second round of exit interviews this summer unearthed far fewer responses marked by frustration and bitterness.

Rare is the company intent on keeping its best female employees and managers that doesn't have some kind of work-family program—a bit of jargon that encompasses everything from day care centers to programs that counsel employees on how to cope with the problems of elderly parents. All share the same purpose: to bolster employee productivity by eliminating some of the distractions that family life inevitably imposes on single parents and two-income couples.

Since 1971 the number of large U.S. employers that provide some kind of day care assistance has grown from 11 to nearly 4,000. Now many companies are going

Q What should female executives be doing to get to the top? (Choose one or more answers.)

A

Develop a broad base of experience	30%
Go into nontraditional positions, such as operations, engineering, manufacturing	14%
Don't change; already doing what they need to do to excel	13%
Make career a higher priority than family life	12%
Be more visible/assertive	12%
Expand network of contacts	9%
It's a matter of time	10%
It's performance, not gender	6%
Get more line (vs. staff) work	6%
Be willing to relocate	5%

much further. Kraft General Foods offers the 2,000 employees at its headquarters in White Plains, New York, a smorgasbord of work-family benefits, including nearby company-subsidized day care centers, extended parental leaves, and vacation time available by the half-day.

Irene Rosenfeld, 39, is executive vice president in charge of the $1-billion-a-year beverage division that makes Kool-Aid and Country Time lemonade. She's also the mother of two young daughters, and she calls the work-family program "terrific." These new policies and services are not for women only. Says Rosenfeld: "Women's issues are rapidly becoming work force issues, and companies that best address them will win in the marketplace." Her own division is winning handily, with double-digit earnings increases in each of the past five years.

About one-third of chief executives in FORTUNE's survey say they've noticed that women's careers often stall out for lack of the kind of informal advice and sponsorship men get from one another. Some companies are trying to remedy that with mentoring programs that pair promising women, nominated by their department heads, with senior executives who proffer one-on-one career counseling. San Francisco–based Pacific Bell started its mentoring drive in late 1989, so the second batch of about 35 female protégées are now nearing the end of their two-year program. What exactly does a mentor do? Consider the experience of D. J. Hulet, 36. She started out in sales 15 years ago, moved up steadily, and in 1990 was assigned mentor John Seymour, 48, vice president and general manager of Pacific Bell's Orange-Riverside division.

Perhaps not surprisingly, she and he view her strengths and weaknesses somewhat differently. "I'm very candid, and I speak my mind," says Hulet. "Other managers have told me, 'You know, if you did the same things you're doing and you were a guy, you'd be OK.'" Really? Seymour explains: "Some people here saw her as very bright but too aggressive. In my opinion there's no such thing as too aggressive. But you do have to learn how to approach people in a way that doesn't create enemies." Seymour coached her on how to influence people without alienating them, manifestly a valuable skill: Hulet was promoted in mid-1991 to regional marketing manager for Los Angeles.

As more women attain high positions, they are reaching out to guide their younger counterparts—sometimes those still in school. A University of Pennsylvania alumnae group called the Trustees' Council of Penn Women, currently headed by First Interstate Bancorp senior vice president Pamela Reis, gives female seniors and business school students a list of about 70 distinguished women they can call for career advice or information. The council also runs a "shadowing" program that lets students spend a workday with a woman executive for a close-up peek at the real world. Constance Duckworth, 37, a partner in fixed-income securities at Goldman Sachs in Chicago, spent time this summer with a 21-year-old Wharton finance student. The two plan to stay in touch. "This is something I didn't have when I was starting out in business," says Duckworth. "It's an 'old-girls' network,' in an embryonic stage."

"Women do need to do more networking," declares Autodesk Chairman Carol Bartz. As a stellar senior executive at Sun Microsystems before taking her current job, Bartz met often with groups of women in the company for brown-bag lunches and tried to make herself available to advise anyone who sought her insights. "At some point I realized, 'Hey, these people are looking up to me,' and my first reaction was, 'I don't have *time* for this,'" she recalls. "But I decided I had to take the responsibility to help pave the way for others—including my daughter, who's 4."

What advice does she give women who aspire to the top job? Like the chief executives in FORTUNE's poll, Bartz believes that women often don't get a wide enough range of experience. "You have to step out of the pack and take risks, even be willing to jump completely out of your element if that's what it takes," she says. It helps, she adds, to start as early as possible. Bartz knows whereof she speaks. Seventeen years ago, while still in her 20s, she quit a comfortable job as a systems analyst at 3M in Atlanta after a marketing executive at headquarters told her the company would never let a woman sell computers.

That fellow is probably kicking himself now. In 1987, with some trepidation, Bartz took over Sun's federal government sales division, an area of the business that was not only entirely alien to her but was populated largely, she says, with "cigar-chomping ex-defense contractors." In just two years under her management, the unit's revenues jumped from $21 million to $124 million.

"There's still a lot of folklore out there about what women can and can't do," observes Kraft General Foods' Irene Rosenfeld. "But don't ever believe you can't do something until you've tried it." In an apt metaphor, given her position, she adds: "Just do your job brilliantly, and sooner or later the cream will rise to the top."

Over and over again, female—and

Q Why is a woman not likely to be a CEO sooner?

A

Women lack long enough experience	64%
Are too concentrated in areas of the company that don't lead to the CEO post, such as communications	50%
Lack broad enough experience	45%
Have not built up solid networks of connections and support	31%
Personal lives and obligation to families get in the way of their careers	29%
Not enough in male-dominated industries, i.e., engineering, manufacturing	17%
It's a matter of time	12%
Current CEO will be in position for a while	9%
Are not aggressive or determined enough to make it to the top	8%
It's a matter of numbers (more men)	6%

male—managers urge women to set career goals and work out a specific plan for achieving them. Hugh McColl Jr., 57, is CEO of NationsBank, the holding company in Charlotte, North Carolina, formed by the recent merger of NCNB and C&S/Sovran. McColl told FORTUNE's pollsters: "Women have to push harder. They often feel that things will be done fairly, whereas men don't believe that, and in reality it's often not the case. So women must ask their bosses what's needed to get to the next level. They then need to make sure they get those opportunities, and ask for feedback every step of the way."

But while you're pushing, keep a stiff upper lip. Mary Herbert, 41, vice president and director of quality for international operations at Motorola, has talked extensively with her female colleagues about their careers. "You do have to go to management and say, 'Here's what I think I can do; here's why; let me try it,'" she says. "But from what I've seen, women who have had a chip on their shoulder—who basically said, 'I should get this job because there are no women at this level of the company'—those are the ones who aren't getting anywhere at all." (See following story.)

The surest way to ascend, of course, is to be so good they can't overlook you. Jill Barad won the No. 2 spot at Mattel largely because as head of the girls' toy division she had overseen a doubling of worldwide sales of Barbie dolls in under four years, to nearly $1 billion (see box). She dismisses the notion that women are at any special disadvantage in business—at least, not if they're smart, hard working, and imaginative. "One day soon, it isn't going to matter anymore what sex anyone is," she says. "It'll come down to a question of who delivers the goods. Performance is what counts."

Hazel O'Leary, 55, an executive vice president at Northern States Power in Minneapolis, agrees: "Whatever you're asked to do, make sure you do a better job of it than the man next to you." But while you're at it, don't neglect to form friendships. "Without losing your own personality, it's important to be part of the prevailing corporate culture," she says. "At this company, it's golf. I've resisted learning to play golf all my life, but I finally had to admit I was missing something that way." O'Leary has bought a set of clubs and tees up with an instructor on weekends.

THE BEST REASON for believing that more women will be in charge before long is that in a ferociously competitive global economy, no company can afford to waste valuable brainpower simply because it's wearing a skirt. That isn't easy for some folks to accept. "Dealing with change is always painful," notes William Boyle, a Monsanto plant manager who is a big believer in the company's diversity-training programs. "But the days when any U.S. company could stand pat, do things the same old way, and say, 'Gosh, look how good we are'—those days are gone."

Happily for women in corporate America, radical change has a way of favoring the underdog. Says Jane White, author of the forthcoming book *A Few Good Women: Breaking the Barriers to Top Management*: "I think we're living in a fantastic time. The ferment that is happening now will push the barricades down." For that to occur, it's crucial that the brightest and best women not become discouraged. As White puts it, "If you're going to be in the forefront of a revolution, you have to keep taking the flak until it's won." F

FIVE MAGIC WORDS: 'GIVE ME A BIGGER CHALLENGE'

Ten years ago Jill Barad, then a junior manager in the boys' toys division at Mattel, went to Tom Kalinske, the senior vice president who had hired her, and said, "Okay, I'm ready now. Give me a bigger challenge." His reply: "I was waiting for you to say that." He assigned her to Barbie dolls. In 1988, the year Barad took over that business, sales hovered around $485 million. The figure has since more than doubled to nearly $1 billion. Mattel's earnings over that time proved as resilient as Barbie's curls, springing from a $113 million loss in 1987 to a $113 million profit last year.

President and chief operating officer since mid-July, Barad never expected to end up the reigning diva of toydom. Raised in New York City, she graduated from Queens College and, perhaps because her father was television director Lawrence Elikann (*Falcon Crest, Knots Landing*), aspired to be an actress. A single day in front of the cameras in a 1973 Dino De Laurentiis film called *Crazy Joe* changed her mind. She moved to California and worked for a cosmetics maker and an ad agency before joining Mattel.

Among her first projects at the company: an icky toy called A Bad Case of Worms. Designed to be slammed against a wall, whence it would slither slimily to the floor, the thing was aptly named—and has since disappeared. "I think everyone thought I managed *out* of that well," says Barad. Ten promotions later, she runs a staff of more than 1,000 worldwide but relies too on the judgment of sons Alexander, 12, and Justin, 9—with now and then a comment from husband Thomas Barad, an independent film producer.

Mattel's Jill Barad is the diva of toydom.

Pleasing little customers can yield big money. When Barad signed on with Mattel in 1981, she earned $38,000 a year. In 1991, as head of operations for North America, she had a pay package that came to $711,539. Not too shabby a decade. "We all have to get the best people we can get," she says. "And you won't get the best people if they don't feel they'll have a chance to rise." Some of the best people won't ever know the chance is there or not—unless, as Barad did, they *ask* for it.

BRACE FOR JAPAN'S HOT NEW STRATEGY

After a mighty effort, top U.S. companies are closing the quality gap. But their toughest rivals—guess who?—have moved on to *flexibility.* It's catch-up time again. ■ *by Thomas A. Stewart*

THERE'S the good news: American business's campaign to improve quality is paying off so well that in many areas the Japanese no longer enjoy a clear lead. Now the bad news: While the quality gap narrows, the world's best competitors are suiting up for an even more challenging contest. It's called flexibility, and its watchwords are change fast, keep costs low, and respond quickly to customers. In the race between the U.S. and Japan, guess who's ahead. Says Aleda Roth, a manufacturing expert at Duke University's business school: "Most American companies are a generation behind—as far behind as they were on quality."

The theory behind flexibility is simple. If you and I are competing and I can read the market quicker, manufacture many different products on the same line, switch from one to another instantly and at low cost, make as much profit on short runs as on long ones, and bring out new offerings faster than you—or do most of these things—then I win. I can parry your every thrust, attack niches in your market that you're too bulky to squeeze into, improve faster, and maintain or even fatten profits while forcing you to follow my lead on prices.

Manufacturers and service companies alike will have to play the game to prosper. Many manufacturers will have to install a sophisticated battery of machine tools called a flexible manufacturing system (FMS), which in a single factory turns out immense varieties of product with computer-controlled robots. All companies will have to overhaul their information systems, methods of developing new products, and other techniques to respond to customers in a quick, versatile, and economical way.

To see flexibility in action, look east. That's the message of a revealing study released in July by Deloitte & Touche consultants. They asked 900 U.S. and Japanese companies to describe their key manufacturing strategies. Among the findings:

■ **The Japanese stress flexibility.** While American manufacturers emphasize product quality (durability, conformance to specifications, and on-time delivery), the Japanese take those as a given. Their focus: more and better product features, flexible factories, expanded customer service, and rapid outpourings of new products.

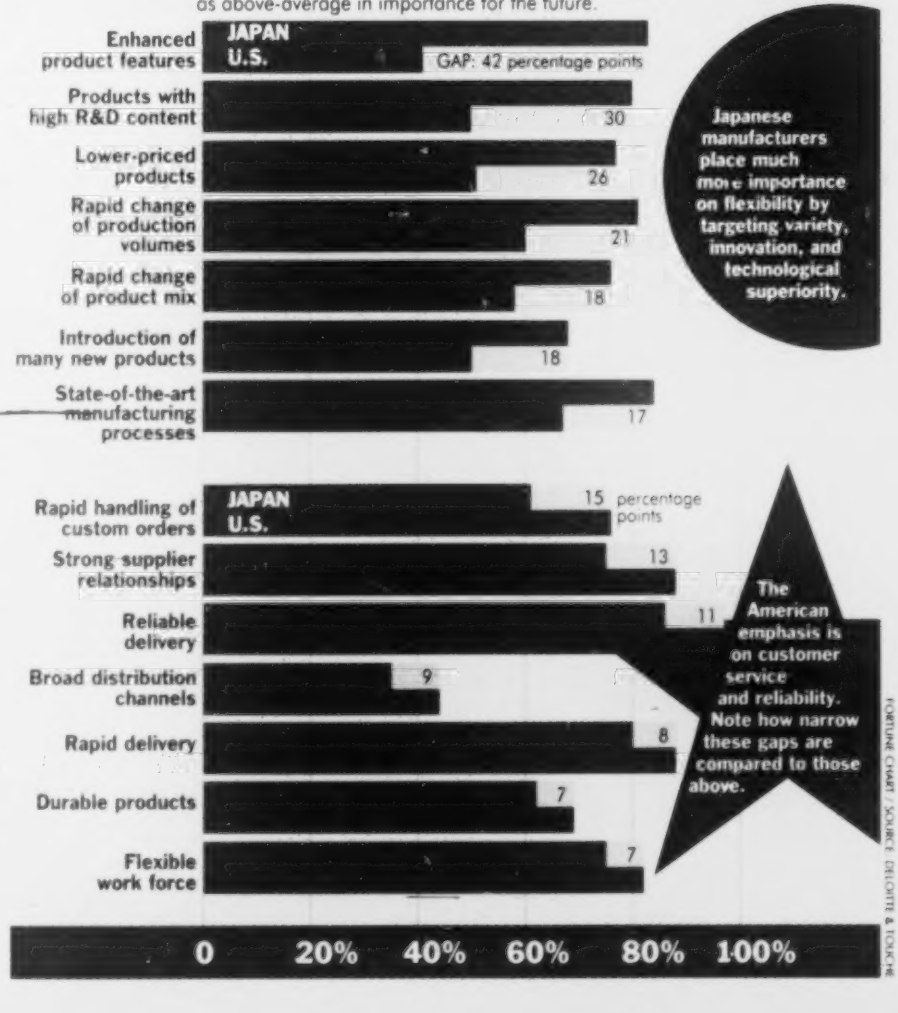
■ **They rate themselves ahead in nearly all aspects of the game,** including rapid changes in production methods and the number of new products they can create. That advantage will grow: Japanese manufacturers are about a third more likely than Americans to say increased flexibility figures importantly in their plans.

■ **They are committed to staying ahead through advanced technology.** From a list of 38 technologies, such as computer-aided design, automated material handling, and robotics, Deloitte & Touche turned up just six in which Americans claimed more experience. Looking toward the future, Japanese companies are 25% more likely to emphasize leading-edge manufacturing, and have bigger investment plans for 33 of 42 advanced techniques.

Eventually, flexibility means dramatically changing one's ideas about how to run a business. In a visionary study that drew on people from 77 U.S. companies, the Iacocca Institute of Lehigh University concluded, "We stand at the threshold of a new era in manufacturing." Beyond mass and lean production beckons "agile production," where factories are small and modular and machinery is reprogrammable to make an almost infinite variety of new or customized goods at low unit cost. Says the institute's operations director, Roger Nagel: "Whatever you thought your break-

FLEXIBILITY RANKS HIGH IN JAPAN'S MANUFACTURING STRATEGY, BUT NOT IN AMERICA'S

Bars show percent of manufacturers who rate a strategy as above-average in importance for the future.



FORTUNE CHART / SOURCE: DELOITTE & TOUCHE

Look closely: Three different cars—a Lexus (center) and two Camrys—move down Toyota's line.

PHOTOGRAPHS BY PETER SIBBALD

Kao serves 280,000 stores with customized crates of goods. A sign tells which product a single production line turns out each day.

even could be, that figure can be a lot smaller today—usually less than half." In an age of demanding consumers, mass production won't cut it.

MANY top-flight U.S. companies are working hard to develop these abilities—Figgie International, General Electric, and Motorola, for example. Baxter Healthcare is testing the ultimate in modularity—an intravenous solutions factory that can be shipped anywhere, set up in a week, and moved anytime—and considers itself one of the world's standard-bearers in a mind-boggling technology called "rapid prototyping." In Deerfield, Illinois, Baxter routinely makes working prototypes of complex medical instruments for its Belgian design center, shipping them just 24 hours after receiving the specs.

As a group, however, the Americans are no match for their transpacific rivals. The Japanese have invested in flexibility for the better part of a decade, but it's only now becoming clear how strong a weapon it is. Says MIT professor Charles Sabel: "The strategy is becoming more and more explicit—to make progress by splitting markets. The goal is a totally plastic production system, one that—within some reasonable area—allows a factory to turn out anything." Even more exciting (or alarming, depending on whose ox is gored), some manufacturers—Toyota, for one—have begun to learn about flexibility what they taught the world about quality: It can actually save money.

Japan's flexibility drive was fueled by a boom in capital spending—$3 trillion in domestic plant and equipment from 1986 to 1991, says Kenneth Courtis, senior economist of Deutsche Bank in Tokyo. Though Japanese investment leveled off as the economy slowed, private industry bought new plant and equipment worth $5,320 a person in Japan last year, vs. $2,177 in America. Those figures are adjusted to reflect the fact that Japan's capital-equipment market is so competitive that prices are 30% lower than in the U.S.

No one knows how much of that money went into flexibility, because investments can serve more than one end. But an analysis by Taka Ananuma of the Tokyo office of the A.T. Kearney consulting firm shows that in one area—spending for information technology—three out of four manufacturers cited as one of their aims flexibility enhancement through such means as FMS and computer-integrated manufacturing, almost twice the number naming the next-leading purpose (office automation).

FLEXIBILITY is an explicit goal at Toshiba, whose $35.5 billion in sales last year came from products as diverse as appliances and computers, light bulbs and power plants. Okay, so the slogan "synchronize production in proportion to customer demand" probably made few hearts leap when Toshiba workers first heard it in 1985. The idea, explains Toshiba President Fumio Sato, is to push Toshiba's two dozen factories to adapt faster to markets. Says Sato: "Customers wanted choices. They wanted a washing machine or a TV set that was precisely right for their needs. We needed variety, not mass production."

Sato hammered home his theme in an almost nonstop series of factory visits. The key to variety: finding ways to make money from ever shorter production runs. Sato urged managers to reduce setup times, shrink lead time, and learn to make more products with the same equipment and people. He says: "Every time I go to a plant I tell the people, 'Smaller lot!' "

If that's your creed, says Lester Thurow, dean of the Sloan School of Management at MIT, a visit to Toshiba's computer factory in Ome, 30 miles from downtown Tokyo, "is like being in heaven." Toshiba calls Ome an "intelligent works" because a snazzy computer network links office, engineering, and factory operations, providing just-in-time information as well as just-in-time parts. Ome workers assemble nine different word processors on the same line and, on an adjacent one, 20 varieties of laptop computers. Usually they make a batch of 20 before changing models, but Toshiba can afford lot sizes as small as ten.

Workers on the lines have been trained to make each model but don't need to rely on memory. A laptop at every post displays a drawing and instructions, which change when the model does. Product life cycles for low-end computers are measured in months these days, so the flexible lines allow the company to guard against running short of a hot model or overproducing one whose sales have slowed. Sato's next goal: to get managers thinking about how to ship small lots fast and cheaply, with quicker feedback from stores, so sales and distribution are as flexible as the factories.

continued

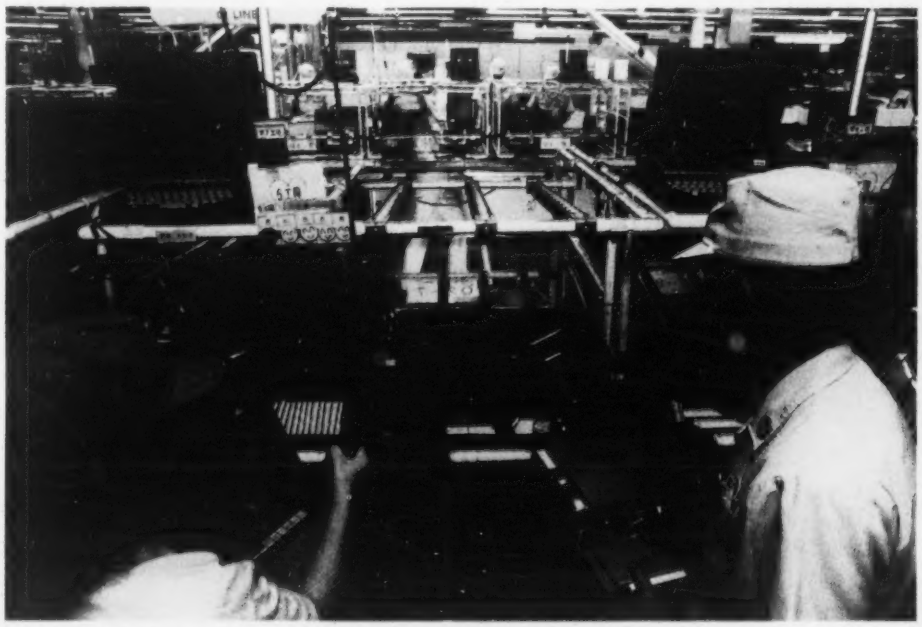
REPORTER ASSOCIATES *Emily Thornton and Andrew Erdman*

He could do worse than check out Kao Corp., Japan's biggest soap and cosmetics company and the sixth largest in the world, with 1991 sales of $4.7 billion. James Abegglen, chairman of Gemini Consulting (Japan), says no company can match the flexibility of Kao's distribution. It derives from a stunning information system that allows the company and its wholly owned wholesalers to deliver goods within 24 hours to any of 280,000 shops, whose average order is for just seven items.

THE GOAL at Kao isn't flexible manufacturing per se. Rather, says Masayuki Abe, a systems development manager, "the purpose is to maximize the flexibility of the whole company's response to demand." That's done by collecting and distributing data with an Orwellian obsessiveness—ten gigabytes of it at any one time, enough to fill 128,000 pages of text. One system links everything: sales and shipping, production and purchasing, accounting, R&D, marketing, hundreds of shopkeepers' cash registers, thousands of salesmen's hand-held computers. According to Abegglen, Kao boasts that the information is so complete that its accountants can turn out a year-end closing statement by noon of the first day of the new year.

Some American consumer products companies collect point-of-sale data—executives may receive information on the previous day's sales, for example—but at Kao the split-second linkage extends back to the factories and labs as well. Brand managers see daily sales, stock, and production figures. Within a day they can learn if a competitor is running a sale, and adjust accordingly. When Kao brings out a new product, it melds point-of-sale information from 216 retailers with a test-marketing operation called the Echo System, which uses focus groups and consumers' calls and letters to gauge public response faster than market surveys do. Says William Best of A.T. Kearney's Tokyo office: "Kao can know if a product will be successful within two weeks of launch. They know who's buying it, whether the packaging works, whether to change anything." That helps explain how Kao stormed into the highly profitable cosmetics business, going from nowhere to No. 2 in Japanese market share in less than ten years.

Kao's network virtually eliminates the lag between an event in the market (Ms. Watanabe buys a bar of soap) and the arrival of the news at the company. That makes Kao less dependent on sales forecasts and buffer inventory. As George Stalk of the Boston Consulting Group, an expert on Japanese corporations, has shown, speedy information lets a company even out production levels and increase variety without drowning in stock; indeed, though Kao makes 564 household products today, vs. 498 in 1987, average inventory as a percent of sales is down to 8.6% from 9.2%.



Toshiba workers can make laptop and desktop computers on one line. The screens show instructions.

As Toshiba and Kao demonstrate, flexibility comes when information feeds the ability to exploit it. A flexible factory is useless if you don't know what's selling, and it doesn't help to know the market cold if you can't react to it back in the plant.

The plunging cost of computing power, combined with low-cost capital, put flexibility within reach even of second-tier companies in Japan. Take Fuji Electric, Japan's fourth-largest maker of electrical machinery (after Hitachi, Toshiba, and Mitsubishi Electric). Fuji's investment in FMS and the like soared starting in 1987—the effort consumes 30% of the capital budget—as come-hither prices for computers and numerically controlled machine tools coincided with cheap money. Says Takashi Kurihara, senior engineer for production technology: "We set a target of reducing lead time 30%, labor costs 70%, and work-in-process inventory 50%. We had to, because these are our customers' goals too."

When Fuji gets an order for an electric motor switch, 20% of the time the buyer wants—and gets—24-hour delivery. Another 40% must arrive within two days. Fuji didn't narrow its product line: Those schedules are for customized work.

The thanks go to flexible manufacturing. For example, at its plant in Saitama prefecture, Fuji makes magnetic contactors used to control motors in machine tools. Beginning in 1988, Fuji installed flexible, computer-integrated lines where setup, parts selection, and assembly are all automated using bar codes that tell the machines what to do. Before those lines, Fuji filled orders in three days. Now Fuji needs 24 hours, using one-third as many workers and almost one-third less inventory—making about 8,000 varieties, three times more than before.

Investment in flexibility isn't cheap, but over time it can save money. That's counterintuitive for managers raised to seek economies of scale. Flexibility offers economies of scope—the ability to spread costs across many products. Frank Andrusko, vice president of Amoco Fabrics & Fibers, has seen the contrast. His company and Nisseki Plastics, a Nippon Oil subsidiary, are partners in a joint venture to make nonwoven fabric used to strengthen foil and paper packaging. "We like long runs," he says. "We use the same equipment, but they make very short runs at higher cost, with more differentiation that lets them get a higher price." The two also approach cus-

With prefabricated units, Baxter Healthcare quickly built an experimental factory in British Columbia.

tomers differently: "Their salespeople don't carry data sheets describing what's available. They ask, 'What do *you* want?' then make it. They need more people in research than we do."

Scale will always matter, but economies of scope have awesome, and sometimes superior, power. Explains Joel Goldhar, a professor at the Illinois Institute of Technology business school: "Compared with a million-unit factory, a two-million-unit factory will always be more economical. But a factory that makes 10,000 units of 200 different products can be just as economical—and with customization you can get unique products, which means monopoly prices."

In a flexible factory, scale and scope reinforce each other. No more vivid example exists than the auto industry. Japanese carmakers are rebuilding the heart of their factories to become even more versatile and labor-efficient—an effort that could once again give them fundamental cost advantages and protect their lead in the time and cost of bringing new cars to market.

Both Toyota and Nissan have zeroed in on the body assembly process, the stage where the separate stampings that make up underbody, side panels, cowl, and roof are welded together. This "body in white" is then rustproofed, painted, and sent to final assembly, where the engine, seats, and controls go in. Body assembly is the least flexible stage of production and therefore the point of greatest leverage; it is also a big user of time and money in model changes. For example, Ford shut two truck plants for the summer to retool for new models.

While many American auto plants still devote a production line to a single model, Toyota began installing flexible lines in the mid-Eighties. Toyota director Mikio Kitano, a bearded, voluble production engineer, says there is no theoretical limit to how many body types these lines can handle, "but four is good enough." Counting sunroofs and other options, that might mean 20 variations. The secret: "intelligent pallets," computer-controlled fixtures each programmed to hold the panels for a different model. The pallets work in rotation, picking up parts for various models as they come down the line and holding them together to be tack-welded by robots. A line can weld a Camry one minute, a Lexus the next, then a Crown, with no pause.

Setting up for a new model takes half the man-hours it used to, just four months—vs. nine of old—while the line continues to manufacture other cars; when all is ready, only one shift is needed to get a new model rolling with the others. As these lines went in, Toyota's capacity utilization climbed steadily, from 75% in 1982 to 95% today. The main reason, says Kitano: the one-shift model change.

Nissan's high-tech Intelligent Body Assembly System, or IBAS, accomplishes the same thing, though its ultimate ambition is more vaulting. Japan's No. 2 carmaker installed its first IBAS in Tochigi, north of Tokyo, in 1989; now it's in place at three other factories in Japan and in Smyrna, Tennessee. The heart of the IBAS is a cluster of 51 robots that grasp body parts, line them up to an accuracy within 0.1 millimeter, weld them, and inspect them, all in 46 seconds. In principle, they can be of any kind; on average, Nissan builds three models in each IBAS, some with several body types.

IT TAKES three months to prepare a Nissan factory for a new model (it used to take 12), mostly to program robots and set up peripheral operations while the line keeps running. Says Yoshitada Sekine, engineering general manager at Nissan's plant at Zama, near Yokohama: "It will one day be possible for data created in Japan to be transmitted by phone or satellite and begin production of a new model simultaneously in any plant in the world."

Nissan describes its strategy as "five anys": to make anything in any volume anywhere at any time by anybody. IBAS is a big step toward the goal, says Sekine: "Minimum economic scale is now linked to the total output of a plant, not the individual model." That is, an IBAS can handle about 20,000 cars a month, but it doesn't much matter which models use the capacity. As U.S. automakers think about dropping whole car lines, Nissan is gearing up to fill market niches with *more* lines.

A month later, it was making IV fluids.

In 1981, Honda, its supremacy in motorcycles challenged by Yamaha, countered by introducing 113 new or revamped models in just 18 months. Yamaha cried uncle after managing 37 changes, announcing it was content to be No. 2. Will a similar "variety war" break out in cars? Says George Stalk of BCG: "I don't

think they can stop. The war's destroying Saab, Renault, and Volvo. For GM and Ford, it's come down to new products—if they blink, they're gone."

THE MINISTRY of International Trade and Industry (MITI) has prodded Japan's carmakers to slow their model changes. With all Asia before them like a ripening honeydew, why risk worse political heat in the U.S. and Europe? But model changes mean less as more cars are built to customer specifications. And history suggests that the Big Three ought not to count on their rivals' forbearance.

Even without a variety war, the Japanese will gain immensely from flexibility. The new lines cost more to build (10% more at Toyota, 20% at Nissan), but a single model change pays more than the difference due to lower tooling and other costs. Toyota claims a 60% saving compared with its old lines. Greater capacity utilization has saved Toyota the cost of building five production lines, and the company predicts that the number of workers on the body lines will fall 30% by 1994 from its level in 1986. By then, Toyota says, total savings will top half a billion dollars.

When it comes to hardware for flexible manufacturing, the Japanese lead is, if anything, widening. Okuma Corp., which makes the world's broadest machine-tool product line in two factories in the hills outside Nagoya, sells 14 flexible manufacturing systems in Japan for every one it exports to America. Though U.S. purchases of industrial robots are at record highs, Japan has already installed 390,000 to America's 45,000, according to Donald Vincent, executive vice president of the Robotic Industries Association. Brian Carlisle, CEO of California robot maker Adept Technology, says this represents a 15- to 20-year lead unless the U.S pace picks up dramatically.

It doesn't help to know the market cold if you can't react to it back in the plant.

Eric Mittelstadt, CEO of GMFanuc Robotics, a U.S.-Japanese joint venture that makes robots, says that when American companies automate, they tend to favor fancy, special-purpose lines to speed mass production rather than flexible systems or inexpensive robots that can be configured to serve many purposes. The $40 billion that GM spent on automation in the 1980s is a classic example but not unique. It took a major effort by managers and employees at GE Appliances in Kentucky to coax versatility out of inflexible labor-saving equipment bought a decade ago.

Just having the right equipment isn't enough, though; more important is how you use it. Six years ago Harvard business school professor Ramchandran Jaikumar reported that the typical American company with an FMS used it to turn out ten different items. Japanese companies 93. Says George Stalk: "We're still seeing that in spades. If you spend $700,000 on a big machining center, the factory manager wants to get his utilization rate up. So he uses it for his highest-volume products, defeating the purpose of the investment."

"For GM and Ford, it's come down to new products—if they blink, they're gone."

That wouldn't happen if U.S. companies saw flexibility as a strategic asset. Most don't, says Eric Mittelstadt, the robot maker: "Few of our customers have thought this through. They usually have a specific project in mind, like a model change, rather than a plan to use robotics to make the whole process flexible."

For a flexible manufacturer, the focus of competition begins to shift. Capital spending matters less when a factory can change its product line by upgrading and reprogramming existing equipment rather than by replacing it: Witness the 60% drop in the cost of tooling up for a new model on Toyota's body assembly lines. The savings show up in lower prices or enhanced features, or can be directed upstream to R&D and downstream to customer service.

Japanese companies surveyed by Deloitte & Touche plan to emphasize both lower-priced products and those with high R&D content—a formidable pairing. Hitachi, Toshiba, Fujitsu, Canon, and others now spend more in R&D than on plant and equipment. They can afford to because of flexible factories, says Fumio Kodama, professor of innovation policy at Saitama University near Tokyo: "The introduction of FMS has paradoxically brought about the situation in which we will not have to worry about manufacturing anymore." Follow the money, economist Courtis says: "The objective of the unprecedented level of investment in innovation and R&D is clearly to become the world's new-product laboratory—the role the U.S. had in the Fifties and Sixties."

Can America catch up? Absolutely, say Craig Giffi, Gregory Seal, and Douglas Shinsato, who conducted the Deloitte & Touche study. And now's the time. They say manufacturing follows an unavoidable progression from product quality (doing it right) through reliability (always doing it right) and only then to flexibility—adding variety and speed.

Many U.S. companies can take that step. Says Adept Technology's Carlisle: "We spent the Eighties on the basics—inventory management, quality control, reducing bureaucracy—stuff the Japanese did in the Sixties and Seventies. Most of that is out of the way now."

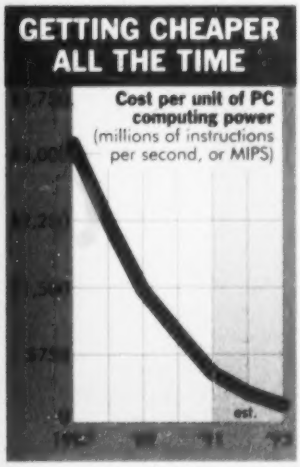
Just in time, as a window of opportunity opens. Fortunately for their competitors, Japanese companies have pushed the pause button as their economy struggles and industry adjusts to a post-bubble financial market. Also, says Paul-Josef Lantz of Baring Securities in Tokyo, the flexibility of Japan's industry has overwhelmed its transportation network. Just-in-time deliveries of ever smaller quantities of ever more goods have clogged roads, forcing some companies to curtail variety proliferation. In response, the Ministry of Transport says it will spend more than $3 trillion in the next ten years on automated distribution centers and rail, harbor, and road improvements—encouraged by the U.S. government in the mysterious belief that the investment will help America compete. (At least it isn't corporate investment, the theory goes, and U.S. contractors might win some business.) When Japan catches its breath, its companies will roar back.

To exploit this fleeting moment American companies must acknowledge that quality is just a start. The flexibility wars are coming. It's not hard to know you're in one, says Eric Mittelstadt: "You see your competitor making lots more products, but he's still meeting you on price, and he's still making a profit, and he's starting to beat you on the content—to get a technology lead—because he can make changes quicker." If that's happening to you—or could—you'd better get going.

WHO'S WINNING THE PC PRICE WARS?

The customer is, but the smaller clonemakers are bleeding. A two-tier market has emerged—high-tech hot stuff at one end, look-alike commodity PCs at the other. ■ *by Andrew Kupfer*

IT'S A WAR you've got to love—if you're a spreadsheet demon, an electronic scribe, or a Dungeons & Dragons nut. Price slashing in the personal computer business—already brutal—turned downright savage in June when Compaq dropped prices as much as 32% and rolled out a new line of machines for under $1,000. Dell Computer, AST Research, and others quickly fired off answering salvos of cuts. Result: In a year when PC prices were expected to fall by 25% or so, they were down 35%, with 1992 barely half over. And the industry behemoth, IBM, hasn't really weighed in yet.


GETTING CHEAPER ALL THE TIME
Cost per unit of PC computing power
(millions of instructions per second, or MIPS)
est.
FORTUNE CHART SOURCE: DATAQUEST

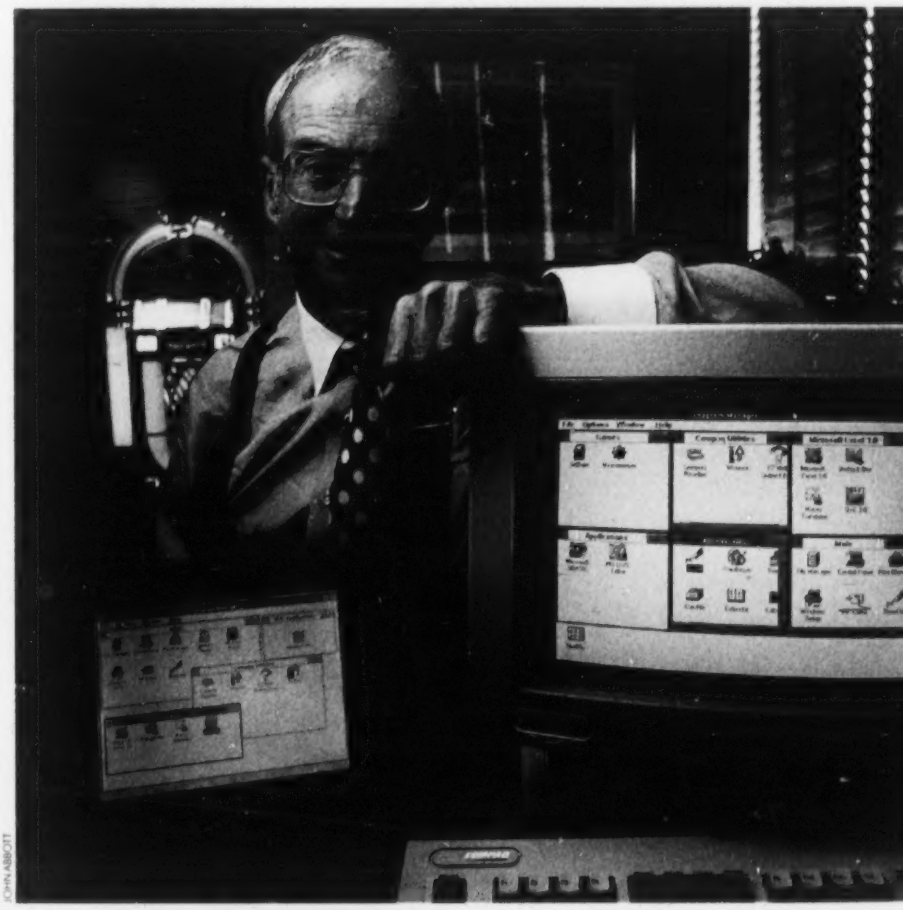
Many companies are hurting. Well-regarded smaller computer makers—Packard Bell, Zeos, Everex, and Northgate among them—have reported losses or scrapped plans to go public. "It's like watching a bunch of guys bleeding to death," says Richard Shaffer, a principal of Technologic Partners in New York City, a computer newsletter publisher. For the folks who own, run, or invest in computer companies, times are scary. They are all asking the same big questions: How did it happen? How far will it go?

The pessimists fear that because PCs are virtually a commodity, sold by units of speed or memory like so many pounds of oats, the business will come to resemble the airline industry—profits minimal or nil, price wars and bankruptcies the order of the day, stocks in a death spiral. The optimists, however, make a strong case that the better analogy is to pharmaceuticals, an industry where innovators collect premiums for new products that become lower-margin generics over time.

The last technical breakthroughs for the airlines were the jet engine in 1952 and the jumbo jet in 1969. By contrast, innovation goes on continually at the high end of the PC market in machines aimed mainly at corporate buyers. Over time prices come trickling down, and eventually the technology replenishes the low end. The PC business is in fact a hybrid, two-tier industry; only the products at the low end behave like commodities.

In any case, the price cuts aren't the whole story. With all the news, you'd think people would be paying less for new computers. Guess again. While every model is getting cheaper, not all consumers are pocketing the savings; many are buying big-

Compaq Chairman Ben Rosen set off the latest round of cuts. A big question: How will IBM respond?


JOHN ABBOTT

ger, better, and more expensive machines. Dell says that revenue per order is up 10% since it reduced its prices in June.

Who is likeliest to survive a shakeout? Technological leaps give established computer companies like IBM, Compaq, Dell, and AST an advantage over the smaller clonemakers, albeit a fleeting one. Because they design their own machines, the big names can incorporate a new technology as soon as it is introduced and thereby differentiate their products at once. Clonemakers have to wait until they can buy the new stuff off the shelf—say, from component makers in Taiwan.

Those same four companies will have a head start when Intel introduces its next microprocessor, the P5, known around the industry as the 586. This next-generation chip will be more than a bit faster than its predecessor, the 486. The P5 will compute five times as much information per second as the original 486. As they did with previous generations of chips, the computer makers took on the role of co-developer, helping Intel test the P5 on working machines. In return they have first crack at the supply when the chip goes into production in the first quarter of next year. So the P5 won't be a commodity for a while.

The promise of lucrative payoffs to come gives big and small players alike plenty of reason to do battle. But the big ones probably won't push the price war much further. Compaq is swamped with orders for its inexpensive ProLinea machine and will need months to work through the backlog. The company claims to have won back 90 corporate clients since mid-June. Dell has been running at 1½ shifts. CEO Michael Dell says, "We've got all the demand we can handle. If we took a pricing action now, our growth rate would be silly." That suggests prices will return to a more orderly descent.

EVEN IF PRICING ORDER is restored, the new machines signal that the PC industry has changed forever. The war has spilled into a new theater of operations: the home front. The Sanford C. Bernstein brokerage firm estimates that by 1996 the number of PCs in American homes will grow by over 25% to 15 million.

Picking the winners out of this roiling sea won't be easy, and investors had better have cast-iron stomachs. Analyst Michael Kwatinetz of Sanford C. Bernstein recommends only AST and Dell, because of their low operating costs and superior service. In August, Dell reported its best quarter ever: Earnings rose 77% to $22 million and sales more than doubled to $457 million. Shaffer of Technologic Partners thinks Compaq bears close attention. It could be a bargain if its strategy works quickly, because, he says, "nobody on Wall Street thinks they're going to pull it off"—at least not right away. Cautious investors may just want to sit this war out. The rest of the year is likely to be unpleasant as margins come under continuing pressure.

The price war was set off by an unlikely combatant. Till its June announcement, Compaq had acted like a racy Jaguar to IBM's stuffy Rolls-Royce, playing up performance and never undercutting anybody's price except Big Blue's. Still, the biggest surprise about Compaq's move is why so astute a man as Chairman Ben Rosen took so long to react to the changing market. Rosen put up the money to found Compaq in 1982 and has helped shape its success from the remove of his New York venture capital firm.

Compaq's vision faltered last year. Rosen and Chief Executive Rod Canion misjudged the economy, thinking the end of the Gulf war would bring recovery, so the company got caught with an inventory glut. Even worse was Compaq's blinkered view of the competitive landscape. "We were focused solely on IBM," admits Rosen. The company paid scant attention to the little clones that were outflanking it with lower-priced machines. Canion's reluctance to bring out a cheap clonebuster eventually caused a rift with the board, which fired him late last year and approved Rosen's plans for the ProLinea. "It would have been better to make the changes we announced in June a year earlier," says Rosen. "But our first quarter in 1991 was a good one. If it ain't broke, don't fix it." Compaq reported its first quarterly loss later in the year. It was broken after all.

Shocked by the loss, Compaq knew it had to get its prices back in line with the rest of the industry. First it had to bring down costs. The company laid off 1,700 people. More important, it changed the way it developed products. Richard Schutte, a Sanford C. Bernstein analyst, says, "With the ProLinea, for the first time Compaq designed a product with the cost of manufacturing in mind, not just raw computing power." The company also renegotiated with key suppliers, even turning down disk drives from Conner Peripherals—which Compaq helped found—to buy some drives from Quantum that cost less. In all, Schutte estimates that Compaq's operating costs will drop from 28% of revenues in 1991 to 24% by next year.

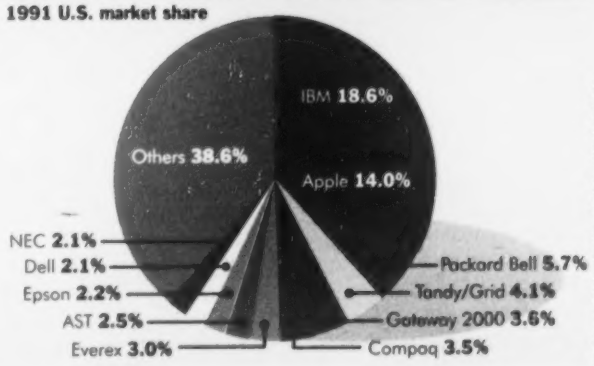
Other companies face problems that threaten to darken their screens forever. Zeos, whose highly regarded notebook computer was one of the first on the market, just announced a quarterly loss of $11 million on $49 million in revenues. Northgate tried hard to find a merger partner but in July ended up selling 51% of its stock for 4 cents a share (its high was nearly $2 in 1990). A month later the company announced a quarterly loss of $10 million on sales of $35 million.

Packard Bell, which sells in stores from Wal-Mart to Circuit City and leads all PC makers in mass merchant sales, had to withdraw its initial public offering earlier this year for lack of takers. So did Cleveland-based Cumulus Corp., whose prospectus revealed that Conner Peripherals is suing it for $2 million, claiming it failed to pay its bills. (Cumulus denies liability and counterclaims breach of contract by Conner.) Safi Quereshy, chief executive of AST Research, says, "Suppliers are being careful who they sell to." Some marginal players must pay up front. *continued*

REPORTER ASSOCIATE *Ani Hadjian*

IN A CROWDED PC MARKET, 'OTHERS' OUTSELL EVERYBODY

1991 U.S. market share



FORTUNE CHART SOURCE: INTERNATIONAL DATA CORP.